

Salter, Jamie ORCID:

<https://orcid.org/0000-0002-7375-1476>, De Ste Croix, Mark, Hughes, Jon, Weston, Matthew and Towlson, Christopher (2018) Current trends in monitoring training load and biological maturity status in elite adolescent football. In: 23rd Annual Congress of European of College of Sport Science, 4th - 7th July 2018, Dublin.

Downloaded from: <http://ray.yorks.j.ac.uk/id/eprint/3760/>

Research at York St John (RaY) is an institutional repository. It supports the principles of open access by making the research outputs of the University available in digital form. Copyright of the items stored in RaY reside with the authors and/or other copyright owners. Users may access full text items free of charge, and may download a copy for private study or non-commercial research. For further reuse terms, see licence terms governing individual outputs. [Institutional Repository Policy Statement](#)

# RaY

Research at the University of York St John

For more information please contact RaY at [ray@yorks.j.ac.uk](mailto:ray@yorks.j.ac.uk)



# CURRENT TRENDS IN BIOLOGICAL MATURITY AND TRAINING LOAD MONITORING IN ELITE ENGLISH ADOLESCENT SOCCER

Salter, J.<sup>1</sup>, De Ste Croix, M.B.A<sup>2</sup>, Hughes, J.D.<sup>2</sup>, Weston, M.<sup>3</sup> and Towlson, C.<sup>4</sup>

<sup>1</sup>School of Sport, York St John University, York, UK

<sup>2</sup>School of Sport and Exercise, University of Gloucestershire, Gloucester, UK

<sup>3</sup>Department of Psychology, Sport and Exercise, School of Social Sciences, Humanities and Law, Teesside University, Middlesbrough, UK

<sup>4</sup>School of Life Sciences, Sport, Health and Exercise Science. The University of Hull, Hull, UK



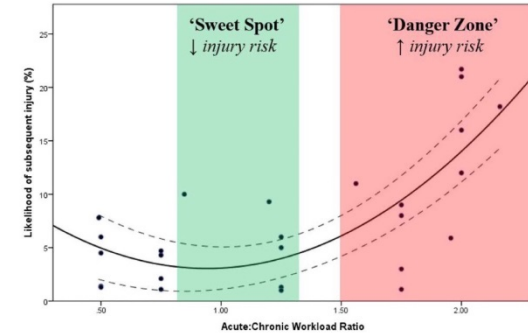
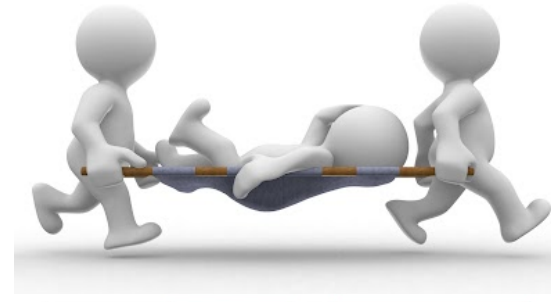


# Rationale

The negative consequences associated with sports injury have been widely researched (Ekstrand, Walden & Hagglund, 2017)

Although consequences of injury during adolescence are less obvious to sports clubs, these can have potentially catastrophic implications for long term development and (de)selection (Myer et al, 2015)

Most injuries within adolescent football are non-contact and soft tissue in nature, potentially linked to sub-optimal training loads (Read et al, 2017; Renshaw & Goodwin, 2016; Tears et al, 2018)



Windt & Gabbett, 2016



# Rationale



Premier  
League



REGIONAL  
TALENT  
CLUB

EPPP (2012) and FA Women's Talent Pathway (2016) provide recommended standards for multifaceted components of player development, and adherence to this used to classify academies (Category 1-4)

Non-prescriptive and open to interpretation which may influence the consistency and therefore the quality of monitoring strategies that are employed

*'188.2 anthropometric assessments' and '188.7. monitoring of physical exertion' [Category 1 academies only]*  
(EPPP,2012)

Varied methods of estimating biological maturity and monitoring training load currently employed, each with its own logistical, systematic and resource based limitations (Mills et al, 2016)



# Aim

*Establish and compare current approaches and perceived barriers of academy practitioners to estimating biological maturity and training load monitoring within UK academies*





# Methodological Approach

A cross-sectional sample of staff from EPPP and RTC academies between Aug and Dec on the 2017/18 season was conducted

Content validity was reviewed via local communications between the research team and applied practitioners (n = 5) and academics in subject area (n = 4)

Two concepts included in the final survey were:

1. *Monitoring of biological maturity (2 unipolar agreement and 6 multiple choice questions)*
2. *Training load monitoring (2 unipolar agreement and 6 multiple choice questions)*

Two Eligibility questions prevented duplications and ensured construct validity:

1. *Have you already completed this survey (Yes or No)*
2. *Are you currently working with academy players within an EPPP or RTC setting? (EPPP, RTC or No)*

Demographic data was collected on the first page: *professional league of their club, academy category rating, job role, employment status and phase (FP, YDP or PDP) predominantly worked with*





# Data Analysis

## Multiple choice questions

Between-academy proportion differences for multiple choice questions were calculated, with 90% confidence limits to express uncertainty and interpreted using standardised scales (Hopkins, 2010)

A conservative approach was adopted, whereby only a *moderate* or higher between-academy difference was reported.

*\*Comparisons were not possible where zero responses were received for an item.*

## Unipolar agreement questions

Unipolar scaled responses were presented as mean  $\pm$  SD and then divided into importance groups based on the 25<sup>th</sup>, 50.<sup>th</sup> and 75<sup>th</sup> centiles (< 25<sup>th</sup> *low*; >25<sup>th</sup> to 50<sup>th</sup>, *moderately low*; >50<sup>th</sup> to 75<sup>th</sup> *moderately high*; >75<sup>th</sup> *high*), purely for interpretation through a distribution approach

A *clear* meaningful difference threshold of 10% was used against the a standardised scale (Hopkins, 2009) and a conservative approach was adopted whereby a clear effect was only declared when the between-group CL did not overlap both positive and negative thresholds by 5% (Hopkins, 2009)



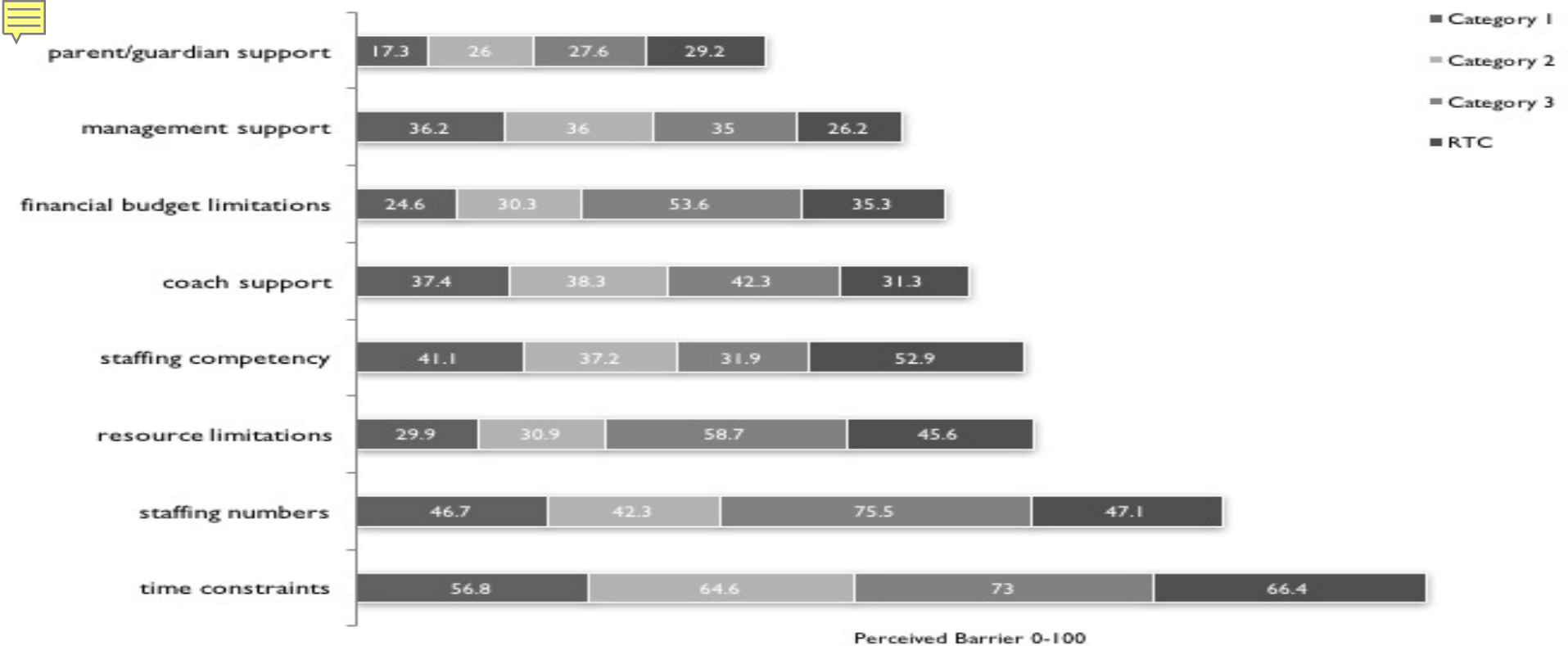


Figure 2. Perceived barriers to biological maturity monitoring



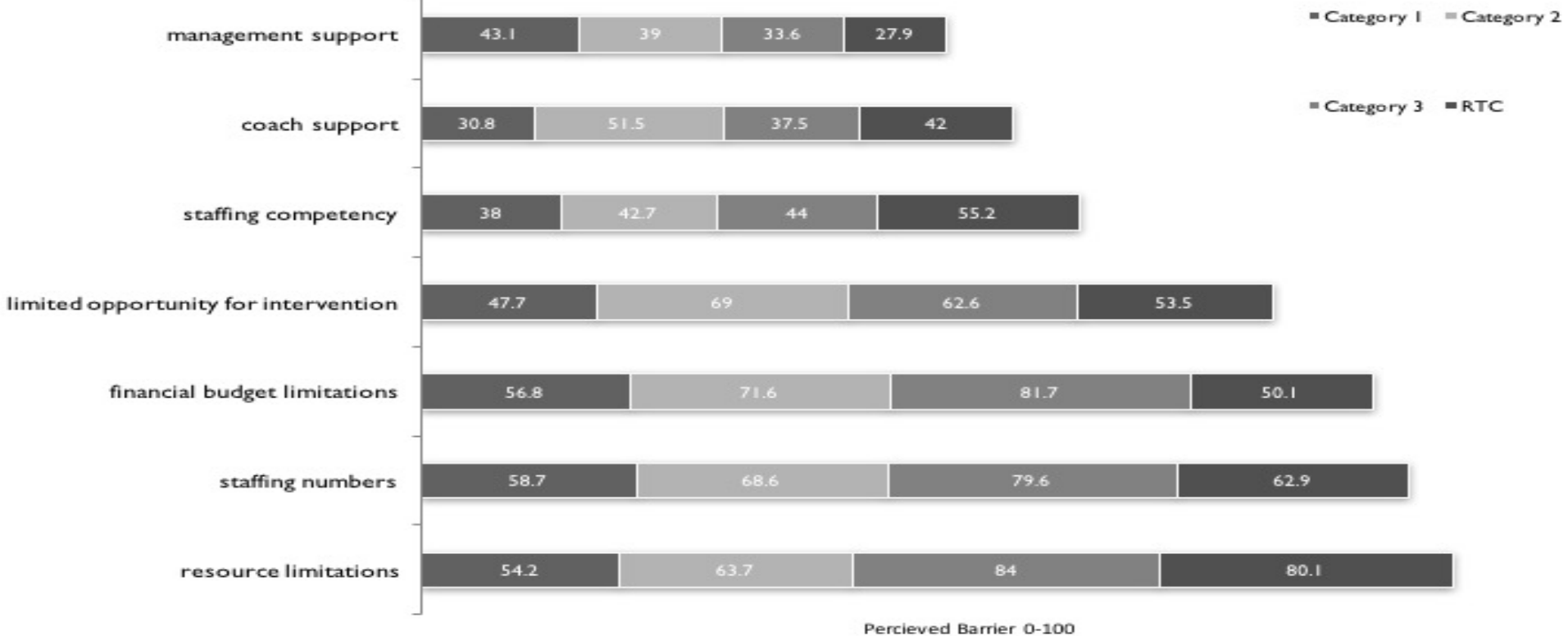


Figure 4. Perceived barriers to training load monitoring

Question and Responses	C1	C2	C3	RTC	Qualitative Inference
<i>Which approach is primarily adopted for estimating biological maturity?</i>					
Prediction of adult height	9 (60)	1 (8)	6 (60)	5 (46)	<b>Very Large</b> C1vC2 <b>Large:</b> C1vC2
Maturity offset	5 (33)	12 (92)	3 (30)	3 (27)	
Skeletal maturity	0 (0)	0 (0)	0 (0)	2 (18)	
Other	1 (7)	0 (0)	1 (10)	1 (9)	
<i>Who is primarily responsible for collecting biological maturation data?</i>					
Medical staff	1 (7)	2 (15)	0 (0)	3 (28)	<b>Large:</b> C1vC2, C1vRTC
Sport Science support staff	14 (93)	11 (85)	8 (80)	8 (72)	
Other	0 (0)	0 (0)	2 (20)	0 (0)	
<i>*Who is biological maturity data reported to?</i>					
Academy manager	10 (67)	8 (62)	7 (70)	6 (55)	
Lead age group coach	12 (80)	12 (92)	8 (80)	9 (82)	
Age group coaches	14 (93)	10 (77)	7 (70)	9 (82)	
Medical staff	15 (100)	11 (85)	9 (90)	9 (82)	
Sport Science support staff	14 (93)	12 (92)	9 (90)	9 (82)	
Intern/student	2 (13)	6 (46)	2 (20)	2 (18)	<b>Moderate:</b> C1vC3; <b>Large:</b> C1vC2
Player	7 (47)	5 (39)	5 (50)	7 (64)	
Parent/guardian	1 (7)	5 (39)	4 (40)	9 (82)	<b>Very large:</b> C1vC2, C1vC3; <b>Extremely Large:</b> C1vRTC
<i>How frequently are biological maturation estimations conducted?</i>					
Annually	0 (0)	0 (0)	1 (10)	0 (0)	
Monthly	3 (20)	5 (39)	2 (20)	1 (9)	<b>Moderate:</b> C1vC2, <b>Large:</b> C1vRTC <b>Moderate:</b> C1vC2
Quarterly	11 (73)	5 (39)	6 (60)	6 (55)	
Six-monthly	0 (0)	0 (0)	1 (10)	3 (27)	
Other	1 (7)	2 (23)	0 (0)	1 (9)	<b>Large:</b> C1vC2
<i>What is the primary method of feedback on biological maturation estimations?</i>					
Infographic	1 (7)	0 (0)	0 (0)	0 (0)	
Verbal communication	1 (7)	2 (15)	1 (10)	8 (73)	<b>Large:</b> C1vC2; <b>Very Large:</b> C1vRTC <b>Very Large:</b> C1vRTC
Visual presentation	9 (60)	8 (62)	6 (60)	2 (18)	
Written report	4 (27)	3 (23)	3 (30)	1 (9)	<b>Large:</b> C1vRTC
<i>*When using biological maturity to group players, what activities is this for?</i>					
Pitch-based sessions	8 (25)	8 (29)	4 (25)	2 (25)	<b>Large :</b> C1vRTC
Gym-based sessions	7 (22)	8 (29)	4 (25)	4 (50)	
Recovery sessions	0 (0)	0 (0)	0 (0)	1 (12.5)	
Competitive fixtures	5 (16)	2 (7)	1 (6)	0 (0)	<b>Large:</b> C1vC2; <b>Very Large:</b> C1vC3 <b>Moderate:</b> C1vC3; <b>Very Large:</b> C1vRTC
Ad-hoc fixtures	7 (22)	6 (21)	3 (19)	1 (12.5)	
Specific fixtures	5 (16)	4 (14)	4 (25)	0 (0)	

Table 2. Responses (%) and qualitative inferences for biological maturity estimations

## Maturity Key Findings

- There were large to very large differences in maturity estimations used – both have errors and should be used with caution
- Sport Science support staff were predominantly responsible, although some shared responsibility
- Maturity data very rarely provided to parents in C1 clubs – ‘autonomy thwarting’
- Bio-banding was considered of moderately low importance – outlines infancy of contest

## Training Load Key Findings

- Category I academies tend to use GPS (external load) monitoring more often
- A larger proportion of academies monitor load through customised spread sheets rather than league standard PMA
- Almost exclusively no medical staff were routinely presented training load data
- Higher ranked academies report data more frequently – although perceived moderately low importance for prescription

Question and Responses	C1	C2	C3	RTC	Qualitative Inference
<i>What is the primary approach to training load monitoring?</i>					
GPS devices	7 (47)	4 (31)	0 (0)	0 (0)	<b>Moderate:</b> C1vC2
Rating of Perceived Exertion	6 (40)	3 (23)	7 (70)	8 (73)	<b>Moderate:</b> C1vC2, C1vC3, C1vRTC
Physiological (TRIMP)	1 (7)	0 (0)	0 (0)	0 (0)	
Coach perceptions	1 (7)	4 (31)	2 (20)	1 (9)	<b>Large:</b> C1vC2, C1vC3
Support staff perceptions	0 (0)	0 (0)	1 (10)	0 (0)	
Wellness data	0 (0)	0 (0)	0 (0)	2 (18)	
Verbal discussion	0 (0)	2 (15)	0 (0)	0 (0)	
<i>How is your training load data compiled?</i>					
PMA	4 (27)	4 (31)	5 (50)	0 (0)	<b>Moderate:</b> C1vRTC
Customised spreadsheet	9 (60)	8 (62)	3 (30)	9 (82)	<b>Large:</b> C1vC3
Monitoring application	1 (7)	0 (0)	0 (0)	1 (9)	
Other	1 (7)	1 (8)	2 (20)	1 (9)	<b>Large:</b> C1vC3
<i>Who is primarily responsible for collating training load data?</i>					
Academy manager	0 (0)	0 (0)	1 (10)	0 (0)	
Lead age group coach	0 (0)	1 (7)	1 (10)	1 (9)	
Age group coaches	0 (0)	1 (7)	0 (0)	1 (9)	
Medical staff	0 (0)	1 (7)	1 (10)	2 (18)	
Sport Sciences support staff	14 (93)	9 (69)	7 (70)	6 (55)	<b>Moderate:</b> C1vRTC
Intern/student	1 (7)	1 (7)	0 (0)	1 (9)	
Players	0 (0)	0 (0)	0 (0)	0 (0)	
<i>Who is training load data reported to?</i>					
Academy manager	0 (0)	0 (0)	2 (20)	3 (27)	
Lead age group coach	4 (27)	8 (62)	2 (20)	0 (0)	
Age group coach	8 (53)	1 (8)	2 (20)	4 (36)	<b>Moderate:</b> C1vRTC; <b>Large:</b> C1vC3; <b>Very Large:</b> C1vC2
Medical Staff	0 (0)	0 (0)	0 (0)	1 (9)	
Sport Science support staff	1 (7)	2 (15)	1 (10)	0 (0)	
Player	1 (7)	1 (8)	0 (0)	1 (9)	
Other	1 (7)	1 (8)	3 (30)	2 (18)	
<i>*How is training load data reported?</i>					
Infographic	3 (13)	2 (11)	1 (7)	1 (8)	<b>Moderate:</b> C1vC3
Verbal communication	6 (26)	3 (17)	4 (29)	3 (23)	<b>Moderate:</b> C1vC2, C1vRTC
Visual presentation	10 (44)	8 (44)	5 (36)	8 (62)	
Written report	5 (22)	5 (28)	4 (29)	1 (8)	<b>Large:</b> C1vRTC
<i>How frequently are training load reports compiled?</i>					
Daily	9 (60)	6 (46)	2 (20)	2 (18)	<b>Large:</b> C1vC3; <b>Very Large:</b> C1vRTC
Weekly	5 (33)	2 (15)	2 (20)	5 (46)	<b>Moderate:</b> C1vC3; <b>Large:</b> C1vC2
Monthly	0 (0)	1 (8)	1 (10)	1 (9)	
Quarterly	0 (0)	0 (0)	0 (0)	2 (18)	
Bi-annually	0 (0)	0 (0)	1 (10)	0 (0)	
Annually	1 (7)	0 (0)	1 (10)	0 (0)	
Other	0 (0)	4 (31)	3 (30)	1 (9)	

Table 3. Responses (%) and qualitative inferences for training load monitoring

# Practical Applications

- Reliability of maturity methods – coaches must consider the error and limitations associated with estimations as they are crucial to long-term development
- Transparency of data – involving all stakeholders (coaches, medical staff, players and parents) may facilitate a better environment for managing load to a group and individual level
- Designate responsibility for monitoring – this will ensure quality, consistency and most importantly impact on the long-term development of adolescent players
- Although there is extensive literature on the associations between injury and load within adult populations, further research is needed to enhance long-term development



# Any questions?

